

10th, 24th and 27th. *New York*: 2nd, 10th, 24th, 25th, 27th to 29th. *North Carolina*: 11th and 12th. *Ohio*: 2nd, 10th, 11th, 14th, 17th, 19th, 20th, 25th, 29th to 31st. *New Jersey*: 3rd, 11th, 12th, 24th, 25th, 28th and 31st. *Nebraska*: 16th, 23rd, 24th and 26th. *Missouri*: 1st, 16th and 31st. *Texas*: 16th and 17th. *Pennsylvania*: 2nd, 11th, 19th, 24th, 25th, 28th and 29th. *Tennessee*: 21st, 23rd and 27th. *Vermont*: 2nd, 9th, 20th, 24th and 28th. *Virginia*: 3rd and 10th. *West Virginia*: 28th and 29th. *Wisconsin*: 1st, 26th, 27th and 31st. On the Pacific coast, a thunder-storm occurred at San Diego, violent on the 17th, at Portland, Or., 17th, and near Dayton on the 2nd; lightning was observed at Red Bluff, Cal., on the 28th.

*Auroras*.—Auroras during August, 1880, have been frequent, and during the 12th and 13th, were of remarkable brilliancy, as well as wide-spread. The following displays, either isolated or covering a slight extent of country, occurred, namely: on the 1st, at Burlington, Vt., Mt. Washington, Bismarek, Pembina, New London; 2nd, at Bismarek and Pembina; 3rd, at Fort Buford and Pembina; 4th, Forts Buford and Stevenson, Pembina, Burlington, Vt. and Newport, Vt.; 6th, Fort Stevenson, Pembina, Mt. Washington, Newport, Vt., Gardiner, Me., Oswego; 7th, Des Moines, Pembina, Fort Buford, Harvard University, North Argyle, N. Y.; 8th, Pembina and Burlington, Vt.; 9th, at New Windsor, Ill.; 10th, Clinton, Ia., New Windsor, Ill. and at Harvard University; 14th, at Helena, Mont., Cornish and Gardiner, Me.; 15th, Deckertown, N. J.; 16th, Newport, R. I.; 21st, Newport, Vt.; 22nd, Harvard University; 27th, Pembina; 28th, Pembina and Wellsboro' Pa.; 29th, Wellsboro, Pa., and Newport, Vt. One aurora was observed on the Pacific coast at Umatilla, Or., on the 31st, from 9 to 11 p. m.: solid arch of light without beams; altitude  $20^{\circ}$ ; color pale white.

On the 5th, a general display occurred north of latitude  $42^{\circ}$ , which was reported from thirteen stations, extending from Gardiner, Me., westward to Fort Stevenson, Dak. The most southerly stations reporting were Buffalo and Thatcher's Island.

On the 12th and 13th a most remarkable and wide-spread aurora occurred. This aurora was observed at about one hundred stations, extending from Eastport, Me., to Bismarek on the 12th and Pembina on the 13th, westward of which point the heavens were obscured. The most southerly stations reporting on the 12th were Delaware Breakwater, Fort Whipple, Va., Jacksonburg, O., Springfield, Ill., and Independence, Mo., and on the 13th, Woodstock, Md., Spiceland, Ind., and Independence, Mo.. The detail of these two displays is omitted for lack of space. While neither arch nor segment was seen at many stations, the following were its most general characteristics: dark segment varying from  $50^{\circ}$  to  $30^{\circ}$  altitude; bright arch varying from  $10^{\circ}$  to  $45^{\circ}$  altitude; brilliancy intermittent; merry dancers, at many stations, in large numbers, while at others, few or no streamers appeared; motionless at a few stations, but generally a lateral motion of varying rapidity; at some stations waves of nebulous light rose in succession to near the zenith and then faded away, while at other stations white masses moved in all directions with undulatory motion; at one station the beams, silvery white, had a tremulous motion resembling ripened grain moved by a light breeze. At several stations coronas, more or less perfect, were seen with streamers extending far beyond the zenith. Color, variously on the 12th, white, silvery white, white changing to uniform green, red and white, straw color, light yellow, pinkish white and bluish white; 13th, white, silvery white, light gray, light yellow, yellow and crimson, yellow changing to purple, pale blue.

On the 26th an aurora was generally visible in New England, while the heavens were obscured in the Lower Lake region. It was reported from six stations, Deckertown, N. J., being the most southerly.

On the 31st a display occurred, probably extending from Orono, Me., to Bismarek. During that evening the heavens, in the Lake region, were generally obscured. The most southerly stations reporting, were: Harvard University in New England, and Breckenridge in the Northwest.

## MISCELLANEOUS PHENOMENA.

*Earthquakes*.—San Diego, 29th, 1:10 p. m., slight. Barrington, N. H., 21st.

*Mirage*.—New London, 11th. Delaware Breakwater, 21st.

*Forest and Prairie Fires*.—Portland, Or., forest fires in vicinity from 1st to 29th, when extinguished by rains. Fort Gibson, 28th, prairie fires.

*Zodiacal Light*.—Yates Center, Kan., 3rd, 6th, 7th, 9th; Harvard University, Mass., 7th, 8th, 9th; Nashville, Tenn., 4th, 7th, 25th, 26th; Havana, Cuba, 6th, 23rd to 28th inc.

*Halos*.—But few solar and lunar halos have been reported during the month. The following lunar rainbows have been reported: Leavenworth, Kan., 17th. San Antonio, Tex., 12th, showing colors distinctly.

*Locusts*.—Dayton, W. T., myriads from 5th to 31st, direction of movement uncertain; garden truck damaged. Pomeroy, W. T., 1st, myriads moving SW. Pike's Peak on summit, 6th, moving west; 16th, near timber line, moving west.

*Sunsets*.—The characteristics of the sky at sunset as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service Stations. Reports from 144 stations show 4,441 observations to have been made, of which 29 were reported doubtful; of the remainder, 4,412 or 84.4 per cent. were followed by the expected weather.

**Meteors.**—A large number of stations report many meteors from the 10th to the 15th. The following only are of interest: Albany, Or., the night of the 13th and 14th, unusual meteoric display, brightest since 1833. Louisville, Ky., 6th, very brilliant meteor at 10 p. m., moved from E. to W. with widening trail and increasing brilliancy; duration 3 minutes. Chattanooga on the 10th, leaving trail of yellow light. Visalia, Cal., on the 7th, brilliant meteor, size of orange, visible 15 seconds. Little Rock, Ark., 9:39 p. m., brilliant, moved from E. to W., color, pale yellow, left trail of 10°.

**Sun Spots.**—The following record of observations, made by Mr. D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanac Office, Washington, D. C.:

DATE— August, 1880.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		REMARKS.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
7th, 9 a. m....	2	23†	.....	.....	1	3	3	23†	One of the spots very large.
8th, 12 m....	1	2	0	0	1	2	4	25†	Faculae. One of the spots very large.
9th, 5 p. m....	1	7	0	0	1	2	5	32†	
10th, 5 p. m....	0	0	0	0	0	0	5	24†	
12th, 5 p. m....	0	6	0	0	0	6	5	30†	Four of the spots very large.
13th, 5 p. m....	0	10	1	4	0	0	4	36†	Faculae.
14th, 5 p. m....	1	4	0	0	0	0	5	40†	
15th, 4 p. m....	0	0	0	0	0	0	5	40†	
16th, 9 a. m....	0	10	0	0	0	0	5	5†	
20th, 5 p. m....	2	5	3	15	1	4	4	40†	Faculae. Spots probably disappeared by solar rotation.
21st, 5 a. m....	0	0	0	8	0	0	3	30	Faculae.
22nd, 10 a. m....	0	0	1	3	0	0	2	25	Faculae.
23rd, 5 p. m....	0	0	0	15	0	0	2	10	Faculae.
24th, 4 p. m....	0	0	1	5	0	0	1	4	
27th, 8 a. m....	1	5	0	0	0	0	2	10	Spots all small.
28th, 9 a. m....	1	8	0	0	1	5	3	18	Faculae. Many of the spots small.
29th, 1 p. m....	0	8	0	0	0	0	2	20	Faculae.
30th, 8 a. m....	0	0	0	0	0	0	2	20	

† Approximated

Mr. Wm. Dawson, at Spiceland, Ind., reports: 1st, 1 group, 5 spots; 2nd, 1 group, 20 spots; 3rd, 1 group, 35 spots; 4th, 1 group, 25 (?) spots; 5th, 1 group, 25 spots, one spot *seen with naked eye*; 6th, 2 groups, 57 spots, large spot near centre *seen with naked eye*; 7th, 4 groups, 40 spots; 8th, 5 groups, 59 spots; 9th, 5 groups, 33 spots, large spot broken in two; 10th and 11th, 4 groups, 33 spots, large spot united on latter date; 12th, 4 groups, 37 spots, large spot very near W. edge; 13th, 5 groups, 57 spots, new group at E. edge; 14th, 4 groups, 60 spots; 15th, 5 groups, 81 spots, 50 spots in 1 group; 17th, 5 groups, 60 spots; 18th, 4 groups, 55 spots; 19th, 4 groups, 57 spots; 20th, 4 groups, 35 spots, 1 group disappeared by rotation, 1 new group; 21st, 2 groups, 29 spots; 22nd, 2 groups, 46 spots; 23d, 3 groups, 42 spots, large group disappearing; 24th, 2 groups, 9 spots, small group disappearing; 25th, 1 group, 8 spots; 26th, 1 group, 3 spots; 27th, 2 groups, 16 spots, new group 4° E. of centre; 28th, 3 groups, 19 spots, new group at E. edge; 29th, 3 groups, 27 spots; 30th, 2 groups, 20 (?) spots; 31st, 2 groups, 19 spots.

Mr. L. Trowbridge at Waterburg, N. Y., Aug. 1st, group near E. margin appeared by rotation, 1 large spot; 2nd, same group, with 2 spots; 5th, 4 spots, 1 large; 6th, 7 spots, 1 large, with a well defined rectangular umbra; 7th new groups visible, old probably broken, had 6 spots; 9th, old group, 5 spots, new, 1 spot, with a new group further E., all these S. of equator, north of equator, new group near E. margin, all the above appeared by rotation; 10th, 3 groups S. of equator; 11th, 4 groups, 5 spots, same as 9th; 12th, 4 groups; 13th, 4 groups, W. group disappeared by rotation and new one appeared E. of N. group; 14th, 1 new group, 5 groups of 7 spots; 15th, 5 groups, 8 spots; 16th, 5 groups, 11 spots; 17th, 5 groups, 1 with 9 spots; 21st and 22nd, 2 groups near W margin; 23rd, all disappeared by rotation; 24th, 1 faint spot near middle of disk S; 28th, 1 group, 1 spot near E. margin; 29th, 2 groups, 1 new, near W. margin.

Norwalk, Ohio, Mr. C. M. Wilcox, observer, seen daily, except 1st, 25th, 26th, 27th. Morrison, Ill., Mr. Maxwell, observer, 9th, 5 large spots.

## NOTES AND EXTRACTS.

The following extracts are from a memoir on *La Lumière Zodiacale*, by P. Marc Dechevrens, S. J., who has made at Zi-Ka-Wei, near Shanghai, China, regular observations of the zodiacal light from September 1st, 1875, to September 1st, 1879:

"The observatory stands in the middle of an immense plain about twenty-five miles from the sea, and in no direction is its horizon broken by the slightest inequality of the country; moreover the observatory is isolated and the few neighboring buildings do not render the air impure or interfere with the most delicate astronomical observations.

### GENERAL DESCRIPTION OF THE PHENOMENA.

"When its two branches (the east in morning, the west in the evening) have the same length—not exceeding 80° or 90°—the zodiacal light assumes the same shape on either side of the horizon; it is that of a lance head or of a half lens a little flattened. But when its length reaches 90°, 100° and beyond, it is rather a long band of light of a nearly constant width, whose splendor does not sensibly diminish even to its extremity, which it is frequently difficult to find among the brilliant stars. Sometimes near the horizon the band appears as it were to be enwrapped near its base in an envelope yet more luminous.